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# PATENT ABSTRACTS OF JAPAN

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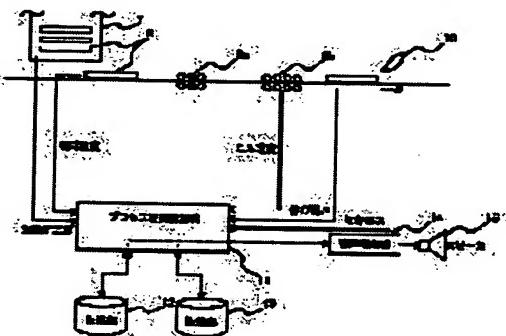
(21)Application number : 06-268022 (71)Applicant : NIPPON STEEL CORP  
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## (54) OUTPUT METHOD AND DEVICE FOR VOICE MESSAGE

### (57)Abstract:

**PURPOSE:** To output a voice message containing a variable message in a system using a computer.  
**CONSTITUTION:** A process control computer (process computer) 11 is connected with a memory section 12 storing fixed messages not changing the message contents in the control state or with the passage of time and a memory section 13 storing variable data messages changing the contents in the control state or with the passage of time. A voice terminal section 14 makes voice synthesis based on the voice output data read from the memory sections 12, 13 via the selection of the process computer 11 and drives a speaker 15 to output the voice message.




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## LEGAL STATUS

[Date of request for examination]

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CLAIMS

[Claim(s)]

[Claim 1] The output method of the voice message which makes it the combination of the variable-data message by which the aforementioned message is inserted in the contents into an eternal fixed message and this fixed message in the computing system equipped with the function which outputs the directions to various kinds of states and operators whom the object controlled or managed generates etc. by the message by speech synthesis by the computer, and is characterized by to synthesize voice based on this.

[Claim 2] The aforementioned variable-data message is the output method of the voice message according to claim 1 characterized by a value changing according to the situation of control of the aforementioned computer or management.

[Claim 3] The system equipped with the function which outputs the directions to various kinds of states and operators who are generated by the system using the process control computer characterized by providing the following etc. by the message by speech synthesis. The 1st storage section in which the fixed message which does not change a description irrespective of a control state or time progress while connecting with the aforementioned process control computer is stored. The 2nd storage section in which the variable-data message from which the content changes according to a control state or time progress while connecting with the aforementioned process control computer is stored. The audio terminal section which synthesizes voice based on the voice output data read from each aforementioned storage section by selection by the aforementioned process control computer.

[Claim 4] The aforementioned fixed message is the output unit of the voice message according to claim 3 characterized by being a message about a facility of a heating furnace, a rolling mill, a cutting machine, etc.

[Claim 5] The aforementioned variable-data message is the output unit of the voice message according to claim 3 characterized by being a thing about operation data.

[Claim 6] The aforementioned operation data are the output unit of the voice message according to claim 5 characterized by being tracking information or actual result information.

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the output method of the voice message for announcing for a worker the method of outputting a voice message using a voice synthesizer and equipment, the directions especially produced in process of operation etc., a heterology, etc. with voice, and equipment.

[0002]

[Description of the Prior Art] For example, at steel production works, the process control computer (henceforth a "process computer") is used for management of the operation (production). Information, such as a heterology on operation, and a line, a state of a facility, is displayed on a display (CRT display), an operator is told about it, and the disposal accompanying this is made to be performed conventionally without retardation. Furthermore, in recent years, carrying out [ voice ] digital processing and announcing the information about the heterology on operation with data, a line, the state of a facility, etc. as a voice with voice by utilization of the voice synthesizer in which the voice output not changing is possible is also performed.

[0003] Drawing 4 is the block diagram showing the computing system equipped with the output function of the voice message by the conventional method.

[0004] Each of the voice synthesizer 4 which changes into voice the data about the display 3 and the heterology which perform information displays, such as the printer 2 for taking hard copy, a heterology on operation, and a line, a state of a facility, a line, the state of a facility, etc. is connected to the process computer 1 which manages operation (control). The registration data division 5 which store descriptions which want to synthesize voice, such as the content of a heterology, and a line, the content of a state of a facility, in the form of digital data, and the loudspeaker 6 which transduces the voice analog signal which synthesized voice electroacoustically are connected to the voice synthesizer 4.

[0005] The registration data division 5 are made to correspond to each of various kinds of required directions, the content of warning, and a line and the operation situation of a facility in operation, they are made into the message text (for example, "rolling actual result length is insufficient") which summarized short and was standardized, without lacking the main point, and code and store this. [ the temperature of a heating furnace is "unusual", ]

[0006] For example, when abnormalities occur to the temperature of a heating furnace during operation, a computer 1 outputs the code number corresponding to "the temperature of a heating furnace is unusual" to a voice synthesizer 4. A voice synthesizer 4 reads the data corresponding to "the temperature of a heating furnace is unusual" from the registration data division 5, synthesizes voice from this, carries out low frequency amplification of this, and drives a loudspeaker 6.

[0007]

[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional example, only the formula-ized fixed message is registered into registration data division, for example, the portion about actual result data, such as temperature and length, was not able to be treated. For this reason, only from the contents of a voice message, a detail has not been

grasped only in the outline of a situation but there was a case where control (adjustment) operation could not be performed immediately.

[0008] this invention aims at offering the output method of the voice message which can output the voice message containing an adjustable message in view of an above-mentioned trouble, and equipment.

[0009]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention shown in a claim 1 makes into the combination of the variable-data message by which the aforementioned message is inserted in the content into an eternal fixed message and this fixed message by the computer in the computing system equipped with the function which outputs the directions to various kinds of states and operators whom the object controlled or managed generates etc. by the message by speech synthesis, and is made it synthesizing voice based on this.

[0010] The data from which a value changes according to the situation of control of the aforementioned computer or management can be used for the variable-data message in this case.

[0011] Moreover, the aforementioned purpose is set to the system equipped with the function which outputs the directions to various kinds of states and operators who are generated by the system which used the process control computer etc. by the message by speech synthesis. The 1st storage section in which the fixed message which does not change a description irrespective of a control state or time progress while connecting with the aforementioned process control computer is stored, The 2nd storage section in which the variable-data message from which the content changes according to a control state or time progress while connecting with the aforementioned process control computer is stored, It is attained by the composition possessing the audio terminal section which synthesizes voice based on the voice output data read from each aforementioned storage section by selection by the aforementioned process control computer.

[0012] The fixed message in this case can be made into the message about a facility of a heating furnace, a rolling mill, a cutting machine, etc.

[0013] Furthermore, the aforementioned variable-data message can be made into the thing about operation data.

[0014] Moreover, the aforementioned operation data can be made into tracking information or actual result information.

[0015]

[Function] According to the output method of the voice message concerning a claim 1, the content of data about the directions to the state and operator of a facility etc. is inserted in a part of finite fixed message as a variable-data message, and one voice message is constituted by this variable-data message and the fixed message. Therefore, numerical expression which is easy to change can be incorporated in a message, a suitable and concrete voice message is obtained, and an operator can do work appropriately and quickly.

[0016] According to the output method of the voice message concerning a claim 2, by using a variable-data message as the data from which a value changes according to the situation of control of a computer or management like temperature and a size, the description to an operator can be shown concretely and the content can be correctly grasped now.

[0017] The storage section which stores a fixed message according to the output unit of the voice message concerning a claim 3, The storage section which stores a variable-data message is connected to a process control computer. By synthesizing voice by the audio terminal section based on the voice output data which combined the fixed message chosen with this process control computer, and the variable-data message Numerical expression can be incorporated in the voice message in process control at a message, a suitable and concrete voice message is obtained, and an operator can do work appropriately and quickly.

[0018] According to the output unit of the voice message concerning a claim 4, in the case of the thing about a facility of a heating furnace, a rolling mill, a cutting machine, etc., a finite message text tends to make a fixed message, and combination with a variable-data message also

becom s asy.

[0019] if the operation data which according to the output unit of the voice messag concerning a claim 5 are alike every moment and change according to an operation situation ar made into a variable-data m ssage, the data with which a prompt action is called for can be directly transmitted to an operator with voice, and an operator can do work appropriately and quickly

④ [0020] According to the output unit of the voice message concerning a claim 6, op ration data can tell an operator various kinds of information required for process control with voice by making it actual result information, such as tracking information, such as manufacture directions data and a material number, or temperature of each part, and rolling, the length of a product, when process control is an object, and an operator can do work appropriately and quickly.

[0021]

[Example] Hereafter, the example of this invention is explained based on a drawing.

[0022] Drawing 1 is the facility block diagram showing the rolling line to which the block diagram showing the output unit of the voice message by this invention and this equipment were applied. Moreover, drawing 2 is explanatory drawing showing the example of a content of the registration message concerning this invention.

[0023] The rolling line shown in drawing 1 is a shape steel rolling line, and consists of rolling stands 9a and 9b which roll out the steel materials 8 heated with the heating furnace 7, and Shache (cutting machine) 10 which is arranged in the back and cuts the steel materials 8 after rolling to predetermined length. In order to control or manage a heating furnace 7, the rolling stands 9a and 9b, and Shache 10, the process computer (process control computer) 11 is formed.

[0024] The temperature of a heating furnace 7, the temperature of steel materials 8, rolling temperature, elongation length, the length of cut, etc. are detected by a sensor (un-illustrating) and the thermometric element, and this electrical signal is taken in by the process computer 11. Furthermore, each of the audio terminal section 14 which synthesizes voice based on the print-out about the registration text and variable data which are outputted from the storing storage section 13 and a process computer 11 in the storage section 12 which stores the fixed message portion of the voice messages, and the operation data (variable data) inserted into a fixed message is connected to the process computer 11. Moreover, the loudspeaker 15 is connected to the audio terminal section 14.

[0025] Drawing 2 shows the content of operation data stored in the fixed description and the storage section 13 which are stored in the storage section 12. Although a fixed description divides roughly and consists of the thing about a heating furnace, a thing about rolling, and a thing about cutting as shown in drawing 2 (a) The actual result information (heating furnace temperature, steel-materials temperature, rolling elongation length; product cutting length, etc.) stored in the storage section 13 as the portion about a temperature value, a size value, etc. is made blank and any fixed message shows these blank sections A, B, C, D, E, F, and G at drawing 2 (b) is inserted. The case where it has the blank section A of drawing 2 "heating furnace temperature separated 60 degrees. Be careful. It becomes".

[0026] In addition, although drawing 2 shows six sorts of examples of a message, it does not pass for this to have shown the part but a large number are prepared in fact. Moreover, tracking information (manufacture directions data, such as mill speed, material No., etc.) besides actual result information is also inserted in blank section A-G. In addition, the operation data inserted in blank section A-G can be created using an integer, the real number, the kanji, and kana.

[0027] A number is attached like "the registration data 1" and the "registration data 2" to a fixed message, the number of \*\* (1 \* \* 2 ...) is put into the blank section as follows, and a text is constituted.

[0028] Registration data 3; "please set the speed of a rolling mill as \*1m, and set table height as \*2m"

"\*1" as "a variable data 1" is inserted by th integer, "\*2" as "a variabl data 2" is ins rted by the real number, for xample, if it is \*1=350 and \*2=13.6, the above-mentioned registration data 3 are expressed with this cas as follows.

[0029] Registration data 3; "please set the speed of a rolling mill as 350m, and set tabl height

as 13.6m"

Next, processing of this invention is explained with reference to drawing 3. Drawing 3 is a flow chart which shows the output method of the voice message in this invention. In addition, "S" in drawing means the step. Moreover, the following — setting — registration data = — 3, \*1=350, and \*2=13.6 — an example — using — this \*1 and \*2 ... is expressed with \*m and the number is expressed with the data number n

[0030] First, a process computer 11 judges the number n of a variable data (S301). Although it is premised on that there are two data of \*1 and \*2 here as described above, supposing n=0 is judged, it will be considered that variable-data \*n is what is not (that is, there is no blank section), the registration data will be read from the storage section 12 (S302), and this will be outputted to the audio terminal section 14 (S303). On the other hand, nothing is read from the storage section 13. In the audio terminal section 14, after performing speech synthesis based on the message data given from the process computer 11, generating the sound signal of audio frequency and performing the power amplification, a message is announced by driving a loudspeaker 15.

[0031] On the other hand, if the judgment by Step 301 is 1<=n, next, a number of [the] will be judged for variable-data m. This processing is performed by Steps 304-308. First, a counter is set to m=0, and is initialized (S304), subsequently to m=m+1 it carries out, and count-up is performed (S305). Then, the sign of \*m of the registration text of the registration data 3 is searched (S306), and further, while the character of \*m is deleted, the value of Data m is inserted (S307).

[0032] Subsequently, the judgment of m=n is performed (S308), and if it is m!=n, processing will be rerun after returning to Step 305. Moreover, if it is m=n, it will be judged as what was able to take correspondence of a fixed message and an adjustable message, and the text which opted for and (S309) edited the informational output will be outputted (S303).

[0033] [Correspondence of invention and an example] In the above example, the storage section 12 is equivalent to the 1st storage section of this invention, and, similarly the storage section 13 is equivalent to the 2nd storage section.

[0034]

[Effect of the Invention] As explained above, this invention shown in the claim 1 In the computing system equipped with the function which outputs the directions to various kinds of states and operators whom the object controlled or managed by the computer generates etc. by the message by speech synthesis Since the content makes it the combination of the variable-data message in which it is inserted into an eternal fixed message and this fixed message and was made to synthesize voice based on this, the aforementioned message The voice message containing a part for suitable and concrete data division can be outputted, and an operator can do work appropriately and quickly.

[0035] Since this invention shown in the claim 2 made the aforementioned variable-data message that from which a value changes according to the situation of control of the aforementioned computer or management, it can show the description to an operator concretely, and the semantic content of a message can be correctly grasped now.

[0036] In the system equipped with the function in which this invention shown in the claim 3 outputs the directions to various kinds of states and operators who are generated by the system which used the process control computer etc. by the message by speech synthesis The 1st storage section in which the fixed message which does not change a description irrespective of a control state or time progress while connecting with the aforementioned process control computer is stored, The 2nd storage section in which the variable-data message from which the content changes according to a control state or time progress while connecting with the aforementioned process control computer is stored, Since it was made the composition possessing the audio terminal section which synthesizes voice based on the voice output data read from each aforementioned storage section by selection by the aforementioned process control computer, a suitable and concrete voice message is obtained and an operator can do work appropriately and quickly.

[0037] Since this invention shown in the claim 4 made the aforementioned fixed message the

- message about a facility of a heating furnace, a rolling mill, a cutting machine, etc., it is easy to make a finite message text, and combination with a variable-data message also becomes easy.
- [0038] Since this invention shown in the claim 5 made the aforementioned variable-data message the thing about operation data, the data with which a prompt action is called for can be directly transmitted to an operator with voice, and an operator can do work appropriately and quickly.
- [0039] Since this invention shown in the claim 6 made the aforementioned operation data tracking information or actual result information, various kinds of information required for process control can be told to an operator with voice, and an operator can do work appropriately and quickly.

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**TECHNICAL FIELD**

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[Industrial Application] this invention relates to the output method of the voice message for announcing for a worker the method of outputting a voice message using a voice synthesizer and equipment, the directions especially produced in process of operation etc., unusual generating, etc. with voice, and equipment.

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PRIOR ART

[Description of the Prior Art] For example, at steel production works, the process control computer (henceforth a "process computer") is used for management of the operation (production). Information, such as a heterology on operation, and a line, a state of a facility, is displayed on a display (CRT display), an operator is told about it, and the disposal accompanying this is made to be performed conventionally without retardation. Furthermore, in recent years, carrying out [ voice ] digital processing and announcing the information about the heterology on operation with data, a line, the state of a facility, etc. as a voice with voice by utilization of the voice synthesizer in which the voice output not changing is possible is also performed.

[0003] Drawing 4 is the block diagram showing the computing system equipped with the output function of the voice message by the conventional method.

[0004] Each of the voice synthesizer 4 which changes into voice the data about the display 3 and the heterology which perform information displays, such as the printer 2 for taking hard copy, a heterology on operation, and a line, a state of a facility, a line, the state of a facility, etc. is connected to the process computer 1 which manages operation (control). The registration data division 5 which store descriptions which want to synthesize voice, such as the content of a heterology, and a line, the content of a state of a facility, in the form of digital data, and the loudspeaker 6 which transduces the voice analog signal which synthesized voice electroacoustically are connected to the voice synthesizer 4.

[0005] The registration data division 5 are made to correspond to each of various kinds of required directions, the content of warning, and a line and the operation situation of a facility in operation, they are made into the message text (for example, "rolling actual result length is insufficient") which summarized short and was standardized, without lacking the main point, and code and store this. [ the temperature of a heating furnace is "unusual", ]

[0006] For example, when abnormalities occur to the temperature of a heating furnace during operation, a computer 1 outputs the code number corresponding to "the temperature of a heating furnace is unusual" to a voice synthesizer 4. A voice synthesizer 4 reads the data corresponding to "the temperature of a heating furnace is unusual" from the registration data division 5, synthesizes voice from this, carries out low frequency amplification of this, and drives a loudspeaker 6.

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## EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, it makes the combination of the variable-data message by which the aforementioned message is inserted in the contents into an eternal fixed message and this fixed message in the computing system equipped with the function which outputs the directions to various kinds of states and operators whom the object controlled or managed generates etc. by the message by speech synthesis by the computer, and it was made it having synthesized voice based on this in this invention shown in the claim 1. Therefore, the voice message containing a part for suitable and concrete data division can be outputted, and an operator can do work appropriately and quickly.

[0035] Since this invention shown in the claim 2 made the aforementioned variable-data message that from which a value changes according to the situation of control of the aforementioned computer or management, it can show the description to an operator concretely, and the semantic content of a message can be correctly grasped now.

[0036] In the system equipped with the function which outputs the directions to various kinds of states and operators who are generated in this invention shown in the claim 3 by the system which used the process control computer etc. by the message by speech synthesis The 1st storage section in which the fixed message which does not change a description irrespective of a control state or time progress while connecting with the aforementioned process control computer is stored, The 2nd storage section in which the variable-data message from which the contents change according to a control state or time progress while connecting with the aforementioned process control computer is stored, It was made the composition possessing the audio terminal section which synthesizes voice based on the voice output data read from each aforementioned storage section by selection by the aforementioned process control computer. Therefore, a suitable and concrete voice message is obtained and an operator can do work appropriately and quickly.

[0037] Since this invention shown in the claim 4 made the aforementioned fixed message the message about a facility of a heating furnace, a rolling mill, a cutting machine, etc., it is easy to make a finite message text, and combination with a variable-data message also becomes easy.

[0038] Since this invention shown in the claim 5 made the aforementioned variable-data message the thing about operation data, the data with which a prompt action is called for can be directly transmitted to an operator with voice, and an operator can do work appropriately and quickly.

[0039] Since this invention shown in the claim 6 made the aforementioned operation data tracking information or actual result information, various kinds of information required for process control can be told to an operator with voice, and an operator can do work appropriately and quickly.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional example, only the formula-ized fixed message is registered into registration data division, for example, the portion about actual result data, such as temperature and length, was not able to be treated. For this reason, only from the contents of a voice message, a detail has not been grasped only in the outline of a situation but there was a case where control (adjustment) operation could not be performed immediately.

[0008] this invention aims at offering the output method of the voice message which can output the voice message containing an adjustable message in view of an above-mentioned trouble, and equipment.

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**MEANS**

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[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention shown in a claim 1 makes into the combination of the variable-data message by which the aforementioned message is inserted in the contents into an eternal fixed message and this fixed message by the computer in the computing system equipped with the function which outputs the directions to various kinds of states and operators whom the object controlled or managed generates etc. by the message by speech synthesis, and is made it synthesizing voice based on this.

[0010] The data from which a value changes according to the situation of control of the aforementioned computer or management can be used for the variable-data message in this case.

[0011] Moreover, the aforementioned purpose is set to the system equipped with the function which outputs the directions to various kinds of states and operators who are generated by the system which used the process control computer etc. by the message by speech synthesis. The 1st storage section in which the fixed message which does not change a description irrespective of a control state or time progress while connecting with the aforementioned process control computer is stored, The 2nd storage section in which the variable-data message from which the contents change according to a control state or time progress while connecting with the aforementioned process control computer is stored, It is attained by the composition possessing the audio terminal section which synthesizes voice based on the voice output data read from each aforementioned storage section by selection by the aforementioned process control computer.

[0012] The fixed message in this case can be made into the message about a facility of a heating furnace, a rolling mill, a cutting machine, etc.

[0013] Furthermore, the aforementioned variable-data message can be made into the thing about operation data.

[0014] Moreover, the aforementioned operation data can be made into tracking information or actual result information.

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## OPERATION

[Function] According to the output method of the voice message concerning a claim 1, the contents of data about the directions to the state and operator of a facility etc. are inserted in a part of finite fixed message as a variable-data message, and one voice message is constituted by this variable-data message and the fixed message. Therefore, numerical expression which is easy to change can be incorporated in a message, a suitable and concrete voice message is obtained, and an operator can do work appropriately and quickly.

[0016] According to the output method of the voice message concerning a claim 2, by using a variable-data message as the data from which a value changes according to the situation of control of a computer or management like temperature and a size, the description to an operator can be shown concretely and the contents can be correctly grasped now.

[0017] The storage section which stores a fixed message according to the output unit of the voice message concerning a claim 3, By connecting to a process control computer the storage section which stores a variable-data message, and synthesizing voice by the audio terminal section based on the voice output data which combined the fixed message chosen with this process control computer, and the variable-data message, numerical expression can be incorporated in the voice message in process control at a message, a suitable and concrete voice message is obtained, and an operator can do work appropriately and quickly.

[0018] According to the output unit of the voice message concerning a claim 4, in the case of the thing about a facility of a heating furnace, a rolling mill, a cutting machine, etc., a finite message text tends to make a fixed message, and combination with a variable-data message also becomes easy.

[0019] if the operation data which according to the output unit of the voice message concerning a claim 5 are alike every moment and change according to an operation situation are made into a variable-data message, the data with which a prompt action is called for can be directly transmitted to an operator with voice, and an operator can do work appropriately and quickly

[0020] According to the output unit of the voice message concerning a claim 6, operation data can tell an operator various kinds of information required for process control with voice by making it actual result information, such as tracking information, such as manufacture directions data and a material number, or temperature of each part, and rolling, the length of a product, when process control is an object, and an operator can do work appropriately and quickly.

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EXAMPLE

[Example] Hereafter, the example of this invention is explained based on a drawing.

[0022] Drawing 1 is the facility block diagram showing the rolling line to which the block diagram showing the output unit of the voice message by this invention and this equipment were applied. Moreover, drawing 2 is explanatory drawing showing the example of contents of the registration message concerning this invention.

[0023] The rolling line shown in drawing 1 is a shape steel rolling line, and consists of rolling stands 9a and 9b which roll out the steel materials 8 heated with the heating furnace 7, and Shache (cutting machine) 10 which is arranged in the back and cuts the steel materials 8 after rolling to predetermined length. In order to control or manage a heating furnace 7, the rolling stands 9a and 9b, and Shache 10, the process computer (process control computer) 11 is formed.

[0024] The temperature of a heating furnace 7, the temperature of steel materials 8, rolling temperature, elongation length, the length of cut, etc. are detected by a sensor (un-illustrating) and the thermometric element, and this electrical signal is taken in by the process computer 11. Furthermore, each of the audio terminal section 14 which synthesizes voice based on the print-out about the registration text and variable data which are outputted from the storing storage section 13 and a process computer 11 in the storage section 12 which stores the fixed message portion of the voice messages, and the operation data (variable data) inserted into a fixed message is connected to the process computer 11. Moreover, the loudspeaker 15 is connected to the audio terminal section 14.

[0025] Drawing 2 shows the content of operation data stored in the fixed description and the storage section 13 which are stored in the storage section 12. Although a fixed description divides roughly and consists of the thing about a heating furnace, a thing about rolling, and a thing about cutting as shown in drawing 2 (a) The actual result information (heating furnace temperature, steel-materials temperature, rolling elongation length, product cutting length, etc.) stored in the storage section 13 as the portion about a temperature value, a size value, etc. is made blank and any fixed message shows these blank sections A, B, C, D, E, F, and G at drawing 2 (b) is inserted. The case where it has the blank section A of drawing 2 "heating furnace temperature separated 60 degrees. Be careful. It becomes".

[0026] In addition, although drawing 2 shows six sorts of examples of a message, it does not pass for this to have shown the part but a large number are prepared in fact. Moreover, tracking information (manufacture directions data, such as mill speed, material No., etc.) besides actual result information is also inserted in blank section A-G. In addition, the operation data inserted in blank section A-G can be created using an integer, the real number, the kanji, and kana.

[0027] A number is attached like "the registration data 1" and the "registration data 2" to a fixed message, the number of \*\*(1 \*\* 2 ...) is put into the blank section as follows, and a text is constituted.

[0028] Registration data 3; "please set the speed of a rolling mill as \*1m, and set table height as \*2m"

"\*1" as "a variable data 1" is inserted by the integer, "\*2" as "a variable data 2" is inserted by the real number, for example, if it is \*1=350 and \*2=13.6, the above-mentioned registration data

3 are expressed with this case as follows.

[0029] Registration data 3; "please set the speed of a rolling mill as 350m, and set table height as 13.6m"

Next, processing of this invention is explained with reference to drawing 3. Drawing 3 is a flow chart which shows the output method of the voice message in this invention. In addition, "S" in drawing means the step. moreover, the following — setting — registration data = — 3, \*1=350, and \*2=13.6 — an example — using — this \*1 and \*2 ... is expressed with \*m and the number is expressed with the data number n

[0030] First, a process computer 11 judges the number n of a variable data (S301). Although it is premised on that there are two data of \*1 and \*2 here as described above, supposing n=0 is judged, it will be considered that variable-data \*n is what is not (that is, there is no blank section), the registration data will be read from the storage section 12 (S302), and this will be outputted to the audio terminal section 14 (S303). On the other hand, nothing is read from the storage section 13. In the audio terminal section 14, after performing speech synthesis based on the message data given from the process computer 11, generating the sound signal of audio frequency and performing the power amplification, a message is announced by driving a loudspeaker 15.

[0031] On the other hand, if the judgment by Step 301 is  $1 <= n$ , next, a number of [the] will be judged for variable-data m. This processing is performed by Steps 304-308. First, a counter is set to m=0, and is initialized (S304), subsequently to m=m+1 it carries out, and count-up is performed (S305). Then, the sign of \*m of the registration text of the registration data 3 is searched (S306), and further, while the character of \*m is deleted, the value of Data m is inserted (S307).

[0032] Subsequently, the judgment of  $m=n$  is performed (S308), and if it is  $m!=n$ , processing will be rerun after returning to Step 305. Moreover, if it is  $m=n$ , it will be judged as what was able to take correspondence of a fixed message and an adjustable message, and the text which opted for and (S309) edited the informational output will be outputted (S303).

[0033] [Correspondence of invention and an example] In the above example, the storage section 12 is equivalent to the 1st storage section of this invention, and, similarly the storage section 13 is equivalent to the 2nd storage section.

[Translation done.]

**\* NOTICES \***

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is the facility block diagram showing the rolling line to which the block diagram showing the output unit of the voice message by this invention and this equipment were applied.

[Drawing 2] It is explanatory drawing showing the example of a content of the registration message concerning this invention.

[Drawing 3] It is the flow chart which shows the output method of the voice message in this invention.

[Drawing 4] It is the block diagram showing the computing system equipped with the output function of the voice message by the conventional method.

**[Description of Notations]**

- 1 Computer
- 2 Printer
- 3 Display
- 4 Voice Synthesizer
- 5 Registration Data Division
- 6 Loudspeaker
- 7 Heating Furnace
- 8 Steel Materials
- 9a, 9b Rolling stand
- 10 Shache
- 11 Process Computer
- 12 Storage Section
- 13 Storage Section
- 14 Audio Terminal Section
- 15 Loudspeaker

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[Translation done.]

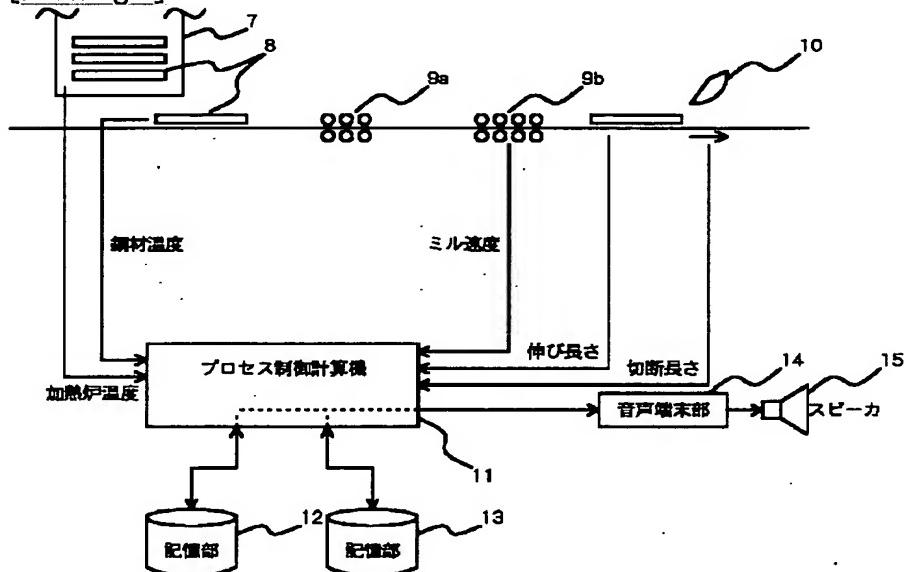
\* NOTICES \*

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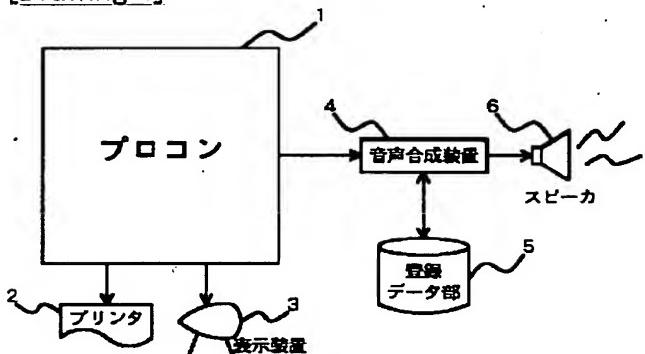
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DRAWINGS

[Drawing 1]



[Drawing 4]

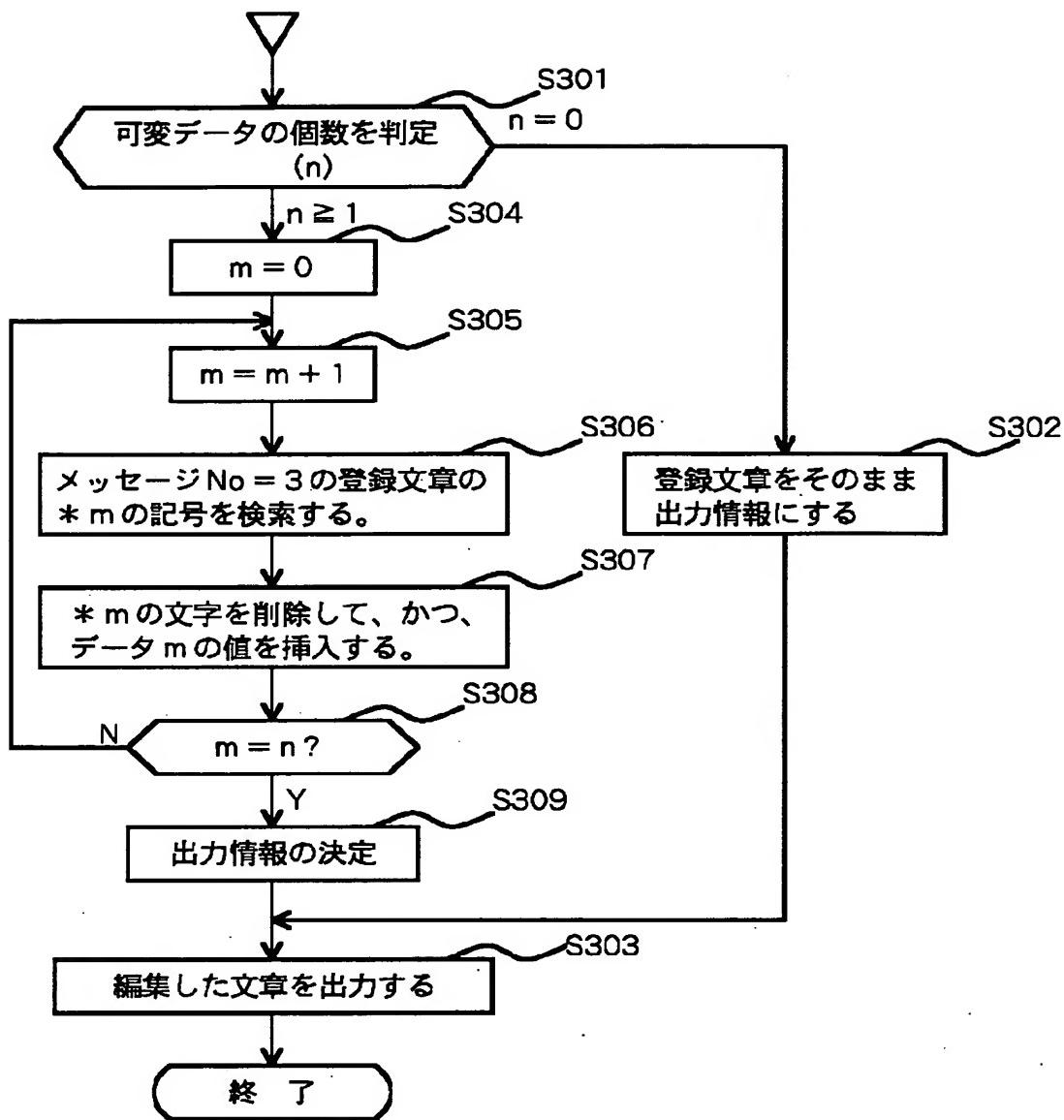


[Drawing 2]

(a)	
加熱炉	(1) 加熱炉温度が④ 度外れました。注意して下さい。 (2) 材料 No. ⑤ の鋼材が⑥ 度の温度外れです。
圧延	(1) 材料 No. ⑦ の鋼材の伸び長さが⑧ m 外れました。 (2) 次の圧延材料から、ミルスピードが⑨ m になります。
切断	(1) 製品切断長さを⑩ m に変更しました。 (2)

(b)	
・トラッキング情報 ・材料 No. 製造指示データ (ミル速度等)	・実機情報 ・加熱炉温度、鋼材温度、 圧延伸び長さ、製品切断長さ…

[Drawing 3]



[Translation done.]

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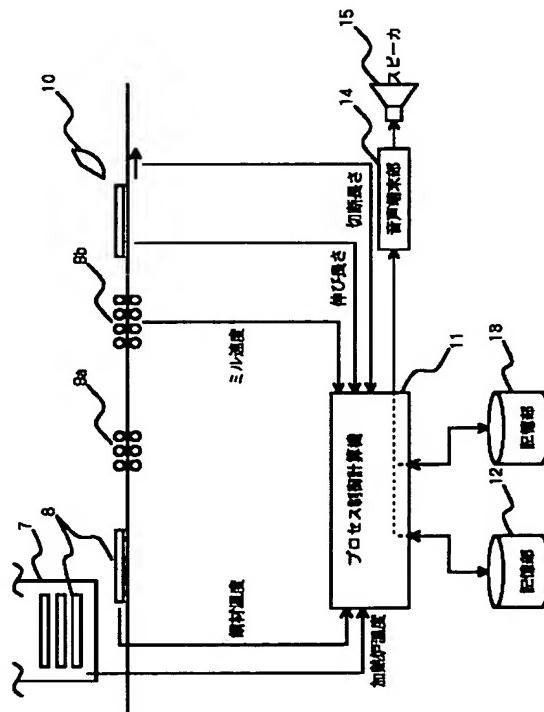
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(54)【発明の名称】 音声メッセージの出力方法及び装置

(57)【要約】

【目的】 計算機を用いたシステムにあって、可変メッセージを含む音声メッセージを出力することができるようとする。

【構成】 プロセス制御計算機(プロコン)11に対し、制御状態または時間的な経過にかかわらずメッセージ内容の変わらない固定メッセージが格納される記憶部12、及びプロコン11に接続されると共に制御状態または時間的な経過に応じて内容の変化する可変データメッセージが格納される記憶部13を接続し、プロコン11の選択により記憶部12、13から読み出された音声出力データを基に音声端末部14で音声合成を行い、スピーカ15を駆動して音声メッセージを出力する。



**【特許請求の範囲】**

【請求項 1】 計算機で制御または管理する対象が発生する各種の状態及びオペレータに対する指示等を音声合成によるメッセージで出力する機能を備えた計算機システムにおいて、前記メッセージを、内容が不变な固定メッセージと該固定メッセージ中に挿入される可変データメッセージの組み合わせにし、これに基づいて音声合成を行うことを特徴とする音声メッセージの出力方法。

【請求項 2】 前記可変データメッセージは、前記計算機の制御または管理の状況に応じて値が変化することを特徴とする請求項 1 記載の音声メッセージの出力方法。

【請求項 3】 プロセス制御用計算機を用いたシステムで発生する各種の状態及びオペレータに対する指示等を音声合成によるメッセージで出力する機能を備えたシステムにおいて、前記プロセス制御用計算機に接続されると共に制御状態または時間的な経過にかかるわらずメッセージ内容の変わらない固定メッセージが格納される第 1 の記憶部と、前記プロセス制御用計算機に接続されると共に制御状態または時間的な経過に応じて内容の変化する可変データメッセージが格納される第 2 の記憶部と、前記プロセス制御用計算機による選択により前記各記憶部から読み出された音声出力データを基に音声合成を行う音声端末部を具備することを特徴とする音声メッセージの出力装置。

【請求項 4】 前記固定メッセージは、加熱炉、圧延機、切断機等の設備に関するメッセージであることを特徴とする請求項 3 記載の音声メッセージの出力装置。

【請求項 5】 前記可変データメッセージは、操業データに関するものであることを特徴とする請求項 3 記載の音声メッセージの出力装置。

【請求項 6】 前記操業データは、トラッキング情報または実績情報であることを特徴とする請求項 5 記載の音声メッセージの出力装置。

**【発明の詳細な説明】**

**【0001】**

【産業上の利用分野】 本発明は、音声合成装置を用いて音声メッセージを出力する方法及び装置、特に、操業等の過程で生じる指示、異常発生等を作業員に音声でアナウンスするための音声メッセージの出力方法及び装置に関するものである。

**【0002】**

【従来の技術】 例えば、鉄鋼生産工場では、その操業（生産）の管理にプロセス制御計算機（以下、「プロコン」という）を用いている。従来より、操業上の異常発生、ラインや設備の状態等の情報は、ディスプレイ（CRT表示装置）に表示して操作者に知らせ、これに伴う処置が遅滞なく行われるようにしている。更に、近年においては、音声をデジタル処理して肉声と変わらぬ音声出力が可能な音声合成装置の実用化により、データとの操業上の異常発生、ラインや設備の状態等に関する情報

を音声でアナウンスすることも行われている。

【0003】 図 4 は従来方法による音声メッセージの出力機能を備えた計算機システムを示すブロック図である。

【0004】 操業の管理（制御）を行うプロコン 1 には、ハードコピーをとるためのプリンタ 2、操業上の異常発生、ラインや設備の状態等の情報表示を行う表示装置 3、異常発生、ラインや設備の状態等に関するデータを音声に変換する音声合成装置 4 の各々が接続されている。音声合成装置 4 には異常発生内容、ラインや設備の状態内容等の音声合成したいメッセージ内容をデジタルデータの形で格納している登録データ部 5、及び音声合成した音声アナログ信号を電気一音響変換するスピーカ 6 が接続されている。

【0005】 登録データ部 5 は、操業において必要な各種の指示、警告内容、ラインや設備の稼働状況の各々に対応させて、要点を欠くことなく且つ短くまとめて定型化したメッセージ文章（例えば、「加熱炉の温度が異常です」、「圧延実績長が不足しています」など）にし、これをコード化して格納している。

【0006】 例えば、操業中に加熱炉の温度に異常が発生した場合、計算機 1 は「加熱炉の温度が異常です」に対応するコード番号を音声合成装置 4 へ出力する。音声合成装置 4 は登録データ部 5 から「加熱炉の温度が異常です」に対応するデータを読み出し、これを音声合成し、これを低周波増幅してスピーカ 6 を駆動する。

**【0007】**

【発明が解決しようとする課題】 しかしながら、上記従来例では、登録データ部にはワンパターン化した固定メッセージのみが登録されており、例えば、温度、長さ等の実績データに関する部分は扱うことができなかった。このため、音声メッセージの内容だけでは状況の概略のみで詳細を把握することはできず、直ちに制御（調整）操作を実行することができない場合があった。

【0008】 本発明は、上述の問題点に鑑み、可変メッセージを含む音声メッセージを出力することが可能な音声メッセージの出力方法及び装置を提供することを目的としている。

**【0009】**

【課題を解決するための手段】 上記の目的を達成するために、請求項 1 に示した発明は、計算機で制御または管理する対象が発生する各種の状態及びオペレータに対する指示等を音声合成によるメッセージで出力する機能を備えた計算機システムにおいて、前記メッセージを、内容が不变な固定メッセージとこの固定メッセージ中に挿入される可変データメッセージの組み合わせにし、これに基づいて音声合成を行うようにしている。

【0010】 この場合の可変データメッセージは、前記計算機の制御または管理の状況に応じて値が変化するデータを用いることができる。

【0011】また、前記目的は、プロセス制御用計算機を用いたシステムで発生する各種の状態及びオペレータに対する指示等を音声合成によるメッセージで出力する機能を備えたシステムにおいて、前記プロセス制御用計算機に接続されると共に制御状態または時間的な経過にかかわらずメッセージ内容の変わらない固定メッセージが格納される第1の記憶部と、前記プロセス制御用計算機に接続されると共に制御状態または時間的な経過に応じて内容の変化する可変データメッセージが格納される第2の記憶部と、前記プロセス制御用計算機による選択により前記各記憶部から読み出された音声出力データを基に音声合成を行う音声端末部を具備する構成によっても達成される。

【0012】この場合の固定メッセージは、加熱炉、圧延機、切断機等の設備に関するメッセージにすることができる。

【0013】さらに、前記可変データメッセージは、操業データに関するものにすることができる。

【0014】また、前記操業データは、トラッキング情報または実績情報にすることができる。

#### 【0015】

【作用】請求項1に係る音声メッセージの出力方法によれば、定型的な固定メッセージの一部に設備等の状態やオペレータに対する指示等に関するデータ内容が可変データメッセージとして挿入され、この可変データメッセージと固定メッセージにより1つの音声メッセージが構成される。したがって、変化しやすい数値的表現等をメッセージに盛り込むことができ、適切かつ具体的な音声メッセージが得られ、オペレータは適切かつ迅速に作業を進めることができる。

【0016】請求項2に係る音声メッセージの出力方法によれば、可変データメッセージを温度、寸法などのように計算機の制御または管理の状況に応じて値が変化するデータにすることで、オペレータに対するメッセージ内容を具体的に示すことができ、内容を正確に把握できるようになる。

【0017】請求項3に係る音声メッセージの出力装置によれば、固定メッセージを格納する記憶部と、可変データメッセージを格納する記憶部をプロセス制御用計算機に接続し、このプロセス制御用計算機で選択した固定メッセージと可変データメッセージを組み合わせた音声出力データを基に音声端末部によって音声合成を行うことにより、プロセス制御における音声メッセージに数値的表現をメッセージに盛り込むことができ、適切かつ具体的な音声メッセージが得られ、オペレータは適切かつ迅速に作業を進めることができる。

【0018】請求項4に係る音声メッセージの出力装置によれば、固定メッセージは、加熱炉、圧延機、切断機等の設備に関するものの場合、定型的なメッセージ文章が作り易く、また、可変データメッセージとの組み合わ

せも容易になる。

【0019】請求項5に係る音声メッセージの出力装置によれば、操業状況に応じて時々刻々に変化する操業データを可変データメッセージにすれば、迅速な対応が求められるデータをオペレータに直接に音声で伝えることができ、オペレータは適切かつ迅速に作業を進めることができる。

【0020】請求項6に係る音声メッセージの出力装置によれば、操業データは、プロセス制御が対象の場合、製造指示データ、材料ナンバー等のトラッキング情報、または各部の温度、圧延や製品の長さ等の実績情報にすることにより、プロセス制御に必要な各種の情報をオペレータに音声で伝えることができ、オペレータは適切かつ迅速に作業を進めることができる。

#### 【0021】

【実施例】以下、本発明の実施例を図面に基づいて説明する。

【0022】図1は本発明による音声メッセージの出力装置を示すブロック図及びこの装置が適用された圧延ラインを示す設備構成図である。また、図2は本発明にかかる登録メッセージの内容例を示す説明図である。

【0023】図1に示す圧延ラインは形鋼圧延ラインであり、加熱炉7で加熱された鋼材8を圧延する圧延スタンド9a, 9b、その後方に配設されて圧延後の鋼材8を所定の長さに切断するシャー(切断機)10から構成される。加熱炉7、圧延スタンド9a, 9b及びシャー10を制御または管理するためにプロコン(プロセス制御計算機)11が設けられている。

【0024】加熱炉7の温度、鋼材8の温度、圧延温度、伸び長さ、切断長さ等がセンサ(不図示)や温度検出器によって検出され、この電気信号がプロコン11に取り込まれる。更に、プロコン11には、音声メッセージの内の固定メッセージ部分を格納する記憶部12、固定メッセージ内に挿入される操業データ(可変データ)を格納記憶部13、プロコン11から出力される登録文書及び可変データに関する出力情報に基づいて音声合成を行う音声端末部14の各々が接続されている。また、音声端末部14には、スピーカ15が接続されている。

【0025】図2は記憶部12に格納される固定メッセージ内容及び記憶部13に格納される操業データ内容を示している。固定メッセージ内容は、例えば、図2

(a)に示すように、大別して加熱炉に関するもの、圧延に関するもの、及び切断に関するものからなるが、いずれの固定メッセージも、温度値、寸法値等に関する部分が空白にされ、この空白部A, B, C, D, E, F, Gに図2(b)に示すように記憶部13に格納されている実績情報(加熱炉温度、鋼材温度、圧延伸び長さ、製品切断長等)が挿入される。例えば、図2の空白部Aを有するケースでは、「加熱炉温度が60度外れました。注意して下さい。」となる。

【0026】なお、図2では6種のメッセージ例を示しているが、これは一部を示したにすぎず、実際には多数が用意される。また、空白部A～Gには、実績情報のほかトラッキング情報（ミル速度等の製造指示データ、材料No.等）も挿入される。なお、空白部A～Gに挿入する操業データは、整数、実数、漢字、及びカナを用いて作成することができる。

【0027】固定メッセージに対して「登録データ1」、「登録データ2」・・・等のようにナンバーを付し、次の様に空白部に置数（\*1、\*2・・・）を入れて文章を構成する。

【0028】登録データ3；「圧延ミルの速度を\*1m、テーブル高さを\*2mに設定して下さい」

このケースでは、「可変データ1」としての「\*1」は整数により、「可変データ2」としての「\*2」は実数により挿入され、例えば、\*1=350、\*2=13.6であれば、上記の登録データ3は以下のように表される。

【0029】登録データ3；「圧延ミルの速度を350m、テーブル高さを13.6mに設定して下さい」

次に、図3を参照して本発明の処理を説明する。図3は本発明における音声メッセージの出力方法を示すフローチャートである。なお、図中の「S」はステップを意味している。また、以下においては、登録データ=3、\*1=350、\*2=13.6を例に用い、この\*1、\*2・・・を\*mで表し、その数をデータ個数nで表している。

【0030】まず、プロコン11は可変データの個数nを判定する（S301）。ここでは上記したように、\*1、\*2の2データがあることを前提にしているが、n=0が判定されたとすると、可変データ\*nは無い（すなわち空白部が無い）ものと見なされ、その登録データが記憶部12から読み出され（S302）、これが音声端末部14へ出力される（S303）。一方、記憶部13からは何も読み出されない。音声端末部14では、プロコン11から与えられたメッセージデータを基に音声合成が行われ、可聴周波数の音声信号が生成され、その電力増幅を行った後、スピーカ15を駆動することによりメッセージがアナウンスされる。

【0031】一方、ステップ301による判定が $1 \leq n$ であれば、次に可変データmが何番目かが判定される。この処理は、ステップ304～308によって実行される。まず、カウンタをm=0にして初期化し（S304）、ついでm=m+1にしてカウントアップが行われる（S305）。この後、登録データ3の登録文章の\*mの記号が検索され（S306）、更に、\*mの文字が削除されると共にデータmの値が挿入される（S307）。

【0032】ついで、m=nの判定が行われ（S308）、m≠nであればステップ305に戻って以降の処

理を再実行する。また、m=nであれば、固定メッセージと可変メッセージの対応がとれたものと判断し、情報の出力を決定し（S309）、編集した文章を出力する（S303）。

【0033】〔発明と実施例の対応〕以上の実施例において、記憶部12が、本発明の第1の記憶部に相当し、記憶部13が、同じく第2の記憶部に相当する。

#### 【0034】

【発明の効果】以上説明したように、請求項1に示した本発明は、計算機で制御または管理する対象が発生する各種の状態及びオペレータに対する指示等を音声合成によるメッセージで出力する機能を備えた計算機システムにおいて、前記メッセージを、内容が不变な固定メッセージと該固定メッセージ中に挿入される可変データメッセージの組み合わせにし、これに基づいて音声合成を行うようにしたので、適切かつ具体的なデータ部分を含む音声メッセージを出力することができ、オペレータは適切かつ迅速に作業を進めることができる。

【0035】請求項2に示した本発明は、前記可変データメッセージは、前記計算機の制御または管理の状況に応じて値が変化するものにしたので、オペレータに対するメッセージ内容を具体的に示すことができ、メッセージの意味内容を正確に把握できるようになる。

【0036】請求項3に示した本発明は、プロセス制御用計算機を用いたシステムで発生する各種の状態及びオペレータに対する指示等を音声合成によるメッセージで出力する機能を備えたシステムにおいて、前記プロセス制御用計算機に接続されると共に制御状態または時間的な経過にかかわらずメッセージ内容の変わらない固定メッセージが格納される第1の記憶部と、前記プロセス制御用計算機に接続されると共に制御状態または時間的な経過に応じて内容の変化する可変データメッセージが格納される第2の記憶部と、前記プロセス制御用計算機による選択により前記各記憶部から読み出された音声出力データを基に音声合成を行う音声端末部を具備する構成にしたので、適切かつ具体的な音声メッセージが得られ、オペレータは適切かつ迅速に作業を進めることができる。

【0037】請求項4に示した本発明は、前記固定メッセージは、加熱炉、圧延機、切断機等の設備に関するメッセージにしたので、定型的なメッセージ文章が作り易く、また、可変データメッセージとの組み合わせも容易になる。

【0038】請求項5に示した本発明は、前記可変データメッセージは、操業データに関するものにしたので、迅速な対応が求められるデータをオペレータに直接に音声で伝えることができ、オペレータは適切かつ迅速に作業を進めることができる。

【0039】請求項6に示した本発明は、前記操業データは、トラッキング情報または実績情報にしたので、ブ

ロセス制御に必要な各種の情報をオペレータに音声で伝えることができ、オペレータは適切かつ迅速に作業を進めることができる。

【図面の簡単な説明】

【図1】本発明による音声メッセージの出力装置を示すブロック図及びこの装置が適用された圧延ラインを示す設備構成図である。

【図2】本発明にかかる登録メッセージの内容例を示す説明図である。

【図3】本発明における音声メッセージの出力方法を示すフローチャートである。

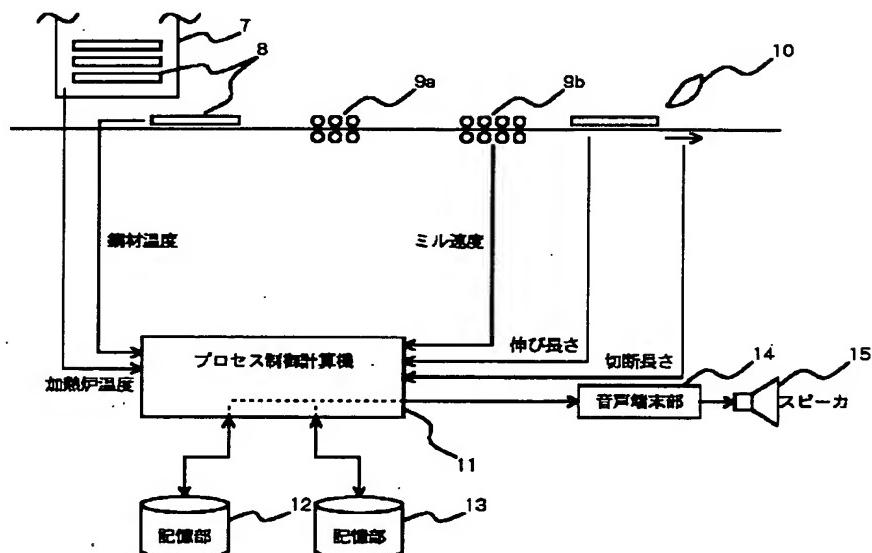
【図4】従来方法による音声メッセージの出力機能を備えた計算機システムを示すブロック図である。

【符号の説明】

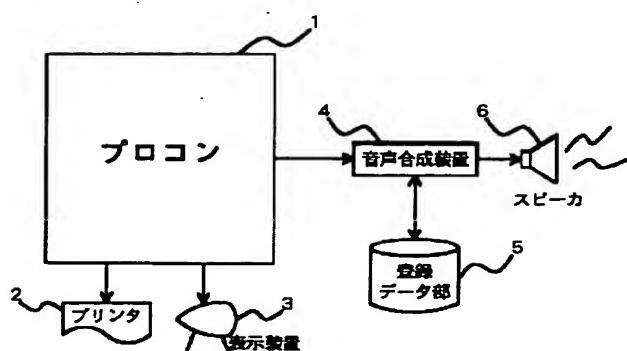
1 計算機

- 2 プリンタ
- 3 表示装置
- 4 音声合成装置
- 5 登録データ部
- 6 スピーカ
- 7 加熱炉
- 8 鋼材
- 9a, 9b 圧延スタンド
- 10 シャー
- 11 プロコン
- 12 記憶部
- 13 記憶部
- 14 音声端末部
- 15 スピーカ

【図1】



【図4】



【図2】

(a)

加熱炉	(1) 加熱炉温度が④ 度外れました。注意して下さい。 (2) 材料 No. ⑤ の鋼材が⑥ 度の温度外れです。
圧延	(1) 材料 No. ⑦ の鋼材の伸び長さが⑧ m外れました。 (2) 次の圧延材料から、ミルスピードが⑨ mになります。
切断	(1) 製品切断長さを⑩ mに変更しました。 (2)

(b)

<ul style="list-style-type: none"> <li>・トラッキング情報           <ul style="list-style-type: none"> <li>・材料No.、製造指示データ (ミル速度、等)</li> </ul> </li>   <li>・実績情報           <ul style="list-style-type: none"> <li>・加熱炉温度、鋼材温度、 圧延伸び長さ、製品切断長さ…</li> </ul> </li> </ul>
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【図3】

